DOCUMENT RESUME

ED 077 793 SO 005 647

AUTHOR Norris, William R.
TITLE Conceptual Systems, Skill of Questioning, and Task-Oriented Microteaching.
PUB DATE 21 Nov 72
NOTE 25p.; Paper presented at the annual meeting of the National Council for the Social Studies (Boston, Massachusetts, November, 1972)

EDRS PRICE MF-$0.65 HC-$3.29
DESCRIPTORS Aptitude; Bibliographic Citations; Cognitive Processes; Conceptual Schemes; Expectation; *Grouping (Instructional Purposes); *Interaction; Interaction Process Analysis; *Learning Characteristics; Matched Groups; Microteaching; Models; Questioning Techniques; Research Design; Research Methodology; *Research Projects; Speeches; Tables (Data); Teaching Methods; *Teaching Techniques
IDENTIFIERS *National Council for the Social Studies

ABSTRACT

Discovery of which learner characteristics or aptitudes interact with different methods of instruction is the objective of this research study. A model is used to match the cognitive, motivational, value, and sensory orientations of the student with forms of presentation considered compatible with characteristics of the learner. Description of the research design precedes an analysis of the results of the study. Tables and figures graphically summarize the findings. (SHM)

FILMED FROM BEST AVAILABLE COPY

ED 077793

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION
THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

CONCEPTUAL SYSTEMS, SKILL OF QUESTIONING, AND TASK-ORIENTED MICROTEACHING

SP005647

William R. Norris

Indiana University

This paper was presented at the annual meeting of the National Council for the Social Studies, Boston, Massachusetts, November 21, 1972.

INTRODUCTION

A common dilemma faced by educational researchers has been that the results of experiments designed to compare the effectiveness of different methods of instruction tend to be inconclusive. The lack of significant results has been due to experimental designs which fail to take into account individual differences (Cronbach, 1957). Gradually, research evidence has been accumulating confirming the existence of interactions of aptitude variables with different methods of instruction. From an aptitude-treatment interaction (ATI) approach to research, all methods of interaction are considered potentially effective. The researcher's primary objective is to discover which learner characteristics or aptitudes interact with different methods of instruction.

A major problem in assessing the differential effects of treatments has been the inadequacy of theory related to individual differences. To avoid pure empiricism the characteristics of the individual and the method of instruction or learning environment must be conceptualized and measured in comparable terms (Hunt, 1971; Salomon, 1971). Hunt (1971) has developed a scheme for coordinating teaching methods with student characteristics referred to as a "matching model." Student characteristics have been described in terms of accessibility channels. The principal accessibility channels

include the cognitive, motivational, value, and sensory orientation of the student. Each of these orientations have been matched with forms of presentation considered compatible with the characteristics of the learner.

In this matching model, student characteristics are conceptualized in terms of cognitive style or conceptual level functioning. Harvey, Hunt, and Schroder (1961) theorized that differences in conceptual level functioning emerged because individuals differed in how they had differentiated and integrated the basic referents or concepts of their conceptual system. A stylistic property referred to as concreteness-abstractness has been used to describe conceptual system complexity. The authors hypothesized that four primary types of conceptual systems could be identified.

System I functioning is characterized by high absolutism, high frequency of normative statements, high ethnocentrism, high religiosity, and belief in the superiority of American morality. Individuals classified as representatives of System II are next to the lowest level of abstract functioning. Strong negative attitudes toward marriage, religion, and the American way of life typify System II functioning. Representatives of System III include strong positive beliefs about friendship, people, and interpersonal relations. The highest level of abstract functioning is System IV. Representatives of this system tend to be information seekers, pragmatists, problem-solvers, flexible, tolerant, and creative.

Structure is the principal organizational property underlying conceptual system functioning (Hunt, 1971). To achieve the proper coordination of teaching methods with student characteristics, methods of presentation must vary in degree of structure. Presentation structure is particularly relevant to treatment development intended to capitalize on student cognitive orientation.

In both the structured and unstructured treatments used in this study, the content related to the classificatory system for analyzing questions developed by Gallagher and Aschner (1963). The two treatments differed in strategy of presentation. Variations in strategy were defined in terms of arbitrariness. In the structured treatment the classificatory system was presented without any theoretical rationale or empirical justification. In contrast, both logical and empirical evidence formed an integral part of the unstructured treatment.

Hunt (1971) stated that an inverse relationship exists between the level of conceptual functioning and the degree of structure in treatments. Students with low levels of conceptual functioning will be accessible through modes of instruction high in structure while students with higher conceptual systems will be more accessible through modes of instruction low in structure. To examine the effects of structured and unstructured modes of instruction on the verbal questioning behavior of teachers with different conceptual systems constituted the problem investigated in this study.

METHOD

Subjects

During the fall semester of 1971 at Indiana University, sixty-four pre-service secondary teachers enrolled in a social studies methods course were selected as the subjects of this study. Subjects had either junior or senior class standing and at least a 2.0 grade point average.

Design

The design used in this study was a variation of Design 10 as described by Campbell and Stanley (1963). Subjects were administered a pre-test which was a measure of aptitude. After subjects were matched on the aptitude measure, they were randomly assigned to two experimental groups. One experimental group received the structured treatment while the other experimental group was administered the unstructured treatment. The two treatments were administered to a total of four classes by the two instructors. Each instructor administered one treatment in the morning and the alternative treatment in the afternoon. Following the two treatments, two observations were made on both experimental groups. This design could be described as an "equivalent groups design."

Aptitude

Individual differences in aptitude were measured using the Conceptual Systems Test (Harvey, 1970). The test consisted of 49 objective items to which subjects indicated their degree of agreement or disagreement on a six-point scale. The version of the CST used in this study contained six factors or subscales. These subscales have been labelled 1) Divine Fate Control, 2) Need for Structure-Order, 3) Need for People, 4) Need to Help People, 5) Interpersonal Aggression, and 6) Anomie. Different combinations of subscale cutoff points were used to determine individual differences in conceptual system functioning. Each treatment group contained 7 System I's, 2 System II's, 13 System III's, 6 System IV's, and 4 admixtures. The subscale scores for admixtures were similar to those for subjects classified as System III's.

Within the CST each subscale was considered an aptitude. Factor analytic procedures have established that one of the stronger subscales is the Need for Structure-Order. The Need for Structure-Order subscale was judged to be a principal measure of conceptual system functioning. Regularity and uniformity are the type of characteristics the Need for Structure-Order Subscale measures. Representative items of this subscale are "I like to have a place for everything and everything in its place," "I don't like for things to be uncertain and unpredictable," and "I like to have my work organized and planned before beginning it." It was hypothesized that the Need for Structure-Order subscale would interact with the structured and unstructured treatments.

Treatments.

The treatments used in this study were described as "structured" and "unstructured." Materials related to the skill of questioning were presented in the two treatments. Subjects received instruction in the system for classifying questions developed by Gallagher and Aschner (1964). This system includes five types of questions: 1) cognitive-memory, 2) convergent, 3) divergent, 4) evaluative, and 5) routine. Questions in this latter category tend to be procedural in nature. In a ten-minute micro-lesson there would be few procedural questions. Therefore, the category of routine questions was eliminated.

In the structured treatment the Gallagher and Aschner system of classifying questions was presented in the form of a written text. The written text took the form of an individualized manual. Each of the four categories was defined in terms of different cognitive processes. A set of descriptors was provided for clarification. Example questions drawn from social studies content were used to illustrate each category. Exercises in discrimination and in writing questions were part of the activities in the text. A self-administered objective test of 25 items followed the explication of all four categories. Subjects commonly completed the manual in one hour. After a break, subjects viewed a protocol tape. This ten-minute video tape provided subjects practice in classifying the questions used by the model teacher. A random sample of questions used

by the model teacher were discussed by the instructor and the subjects. One hour and forty-five minutes was allotted for the structured treatment. In the structured treatment, neither the manual nor the instructor made any effort to explain, to elaborate, or to justify the theoretical rationale from which the Gallagher and Aschner system of classifying questions evolved.

In contrast, the unstructured treatment was designed to provide the subjects with the theoretical rationale underlying the Gallagher and Aschner system. A handout describing Guilford's conceptualization of human intelligence was read and discussed by the subjects. Subjects were instructed to read a second handout which provided supportive evidence for the utility of the Gallagher and Aschner system (1963). A set of transparencies for each category provided subjects with the same example questions, discrimination practice, and descriptors as used in the structured treatment. The instructor used these four sets of transparencies to stimulate an open discussion. Subjects viewed and informally discussed the protocol video tape in the unstructured treatment also. An equivalent amount of time was allocated to the unstructured treatment, one hour and forty-five minutes. Both treatments were administered during regularly scheduled class meetings immediately preceding the microteaching of the hypothesis micro-lesson.

Dependent Variable

The number of questions classified in each of the categories were used to formulate a set of four questioning

ratios for each subject. Each ratio was formed by dividing the total number of questions in one category by the sum of the questions in all four categories. For example, the cognitive-memory question ratio was derived by dividing the number of cognitive-memory questions asked by the sum of questions asked in all four categories (CM/CM+C+D+E).

Audio recordings were made of each micro-lesson. Each micro-lesson was coded using a modification of Flanders' Interaction Analysis Categories (Flanders, 1970). Category 1, Accepts Feelings, was omitted because of its normally low incidence. Category 10 was dichotomized into productive and non-productive silence. Categories 4, 8, and 9 were subscripted to incorporate the Gallagher and Aschner system for classifying questions. These modifications resulted in a 19 category interaction analysis instrument.

Ten hours of formal instruction and ten hours of practice coding constituted the training received by the three coders used in this study. Coders were trained using materials on Flanders Interaction Analysis Categories (Amidon and Flanders, 1967) and the Gallagher and Aschner (1963) system of classifying questions. Six checks of intercoder and intracoder agreement were made using a random sample of audio tapes collected during this study.

Both intercoder and intracoder reliability coefficients were calculated using all 19 categories and the subscripted categories 4, 8, and 9, plus category 5. The range of intercoder reliability coefficients for the 19 categories was .51

to .79 with a mean of .68. Intracoder reliability coefficients for the same number of categories ranged from .64 to .77. The mean for intracoder reliability using 19 categories was .73. When intercoder reliability coefficients were calculated using the subscripted categories 4, 5, 8, and 9, the range was .51 to .91 and the mean was .78. Using the same categories intracoder reliability coefficients extended from .75 to .83. The mean intracoder reliability for these subscripted categories was .79. As a means of comparison the data were collapsed into the original nine categories in the Flanders' instrument. The ranges of intercoder and intracoder reliability coefficients for these data were .51 to .92 and .70 to .86 respectively. Means of intercoder and intracoder reliability were .80 and .78. The ranges and the means of intercoder and intracoder reliability coefficients for the collapsed data were judged comparable to those reported in other research studies using interaction analysis (Flanders, 1970).

Microteaching

Subjects were scheduled to report to the microteaching laboratory during the late afternoon Monday through Friday. After the first microteaching session conducted with peers, subjects worked with different groups of four or five junior high school students each time. A complete teach-reteach cycle for an assigned microteaching task required two weeks. Prior to treatments subjects had taught a total of thirty minutes in the laboratory. The principal objective of the hypothesis micro-lesson which followed the administration of the treatments was to engage students in the exploration of a problem. Subjects were instructed to design micro-lessons to encourage inferencing and hypothesizing by the students.

RESULTS

Ordinal and Disordinal Interactions

The key concept in understanding the ATI approach to research is interaction. A convenient means of conceptualizing ATI research is by reference to two regression lines representing the relationship between two treatments, one aptitude, and one outcome measure. Traditionally, research studies on teaching have failed to detect any significant difference between methods of instruction. Regression lines representing the different methods tend to be parallel throughout the entire range of both the aptitude and the outcome variables. Since the regression lines do not cross, the decision to assign all students to the treatment in which student performance was highest would be reasonable.

Hypotheses which state that aptitudes and treatments will interact imply that regression lines will intersect. Lubin (1961) noted that interactions could be either ordinal or disordinal. Ordinal interactions occur when the slopes of the regression lines are not parallel and they intersect at a point beyond the range of either the aptitude or the outcome variable. The superiority of one treatment over the other for all levels of the aptitude proves to be the case. In an ordinal interaction, however, a

point is reached with respect to the aptitude variable where the regression lines become significantly different. In this situation, a decision to assign all subjects to the superior treatment might be questionable. The cost of the two treatments could differ considerably. For that portion of the aptitude range where the two treatments are not significantly different, all students might be assigned more profitably to the less effective treatment.

Disordinal interactions imply the intersection of regression lines within the ranges of the aptitude and criterion variables. The treatments are judged to be differentially effective if the homogeneity of group regressions test is significant. With the knowledge at what aptitude levels the treatments become significantly different, a decision maker can improve the quality of his decision by assigning students to treatments designed to take into account individual differences in aptitude.

Tests for Disordinal Interaction

Bracht (1970) suggested that a more efficient procedure for detecting interactions than analysis of variance was regression analysis. The homogeneity of group regressions test drawn from analysis of covariance techniques was used as a direct means of detecting the existence of significant interactions (Walker and Lev, 1953). To verify whether an interaction was ordinal or disordinal the point at which the regression lines cross was located. Since treatments can produce results opposite to those

hypothesized, the signs for the regression slopes and the correlation coefficients of each treatment group were checked for directionality. The Neyman-Johnson technique (Walker and Lev, 1953) was used to calculate the aptitude levels at which the instructional treatments became significantly different. For comparative purposes the plots within each region of significance were converted to percentages. To interpret these percentages properly reference was made to the distributive statistics related to each treatment group. Means, standard deviations, skewness, and kurtosis provided information as to the normalcy of scores. Correlation coefficients for each regression line indicated the degree of confidence that could be attributed to the differential effectiveness of the treatments.

Analysis of Data

A total of eight hypotheses was tested in this study. Each of the four questioning ratios was examined on both the teach and the reteach sessions of the hypothesis micro-lesson. The structured treatment was designed to accommodate subjects with high Need for Structure-Order subscale scores. Subjects who scored low on this subscale were considered more accessible through the unstructured treatment. It was hypothesized that these subjects would have significantly lower cognitive-memory, convergent, and evaluative question ratios compared to those subjects who received treatments inconsistent with their aptitude scores. The nature of the microteaching task suggested that divergent questions were important. Therefore, it was antici-

pated that significantly higher divergent question ratios would be obtained from subjects who were matched properly as to treatments compared to those subjects who were mismatched.

Results of the homogeneity of group regressions test are reported in Table 1. On both the teach and the reteach sessions, non-significant F ratios were calculated for the convergent, divergent, and evaluative question ratios. Significant F ratios were detected on each of the microteaching sessions for the cognitive-memory question ratio.

Insert Table 1

For the teach session of the hypothesis micro-lesson, the F ratio was 7.61 and significant at the .01 level. The F ratio for the reteach session dropped to 5.36 but was still significant ($p < .05$). On the teach session the regression lines intersected at a point where X=4.55 and Y=.32. These figures changed to X=3.81 and Y=.30 for the reteach session. In both instances, the points of intersection were located within the range of the aptitude and the criterion variables. The point of intersection was stable in relation to the Y axis but shifted noticeably with respect to the X axis. For the teach session the point of intersection was approximately 35 points higher than the cutoff point for concrete and abstract conceptual functioning on the Need for Structure-Order subscale. The regression lines crossed below the cutoff point at an equivalent distance on the reteach session. Despite the shift in the point

of intersection both sets of data met the necessary conditions for being classified disordinal interactions.

Insert Tables 2 and 3

Data in Tables 2 and 3 confirm the fact that the directionality of the two disordinal interactions was as predicted. In both sessions a regression line for Group 1, the unstructured treatment, was positive. Similarly, a negative regression line occurred for Group 2, the structured treatment. This evidence agreed with the prediction that subjects who received treatments which matched their aptitude characteristics would obtain lower cognitive-memory question ratios than subjects who were assigned to treatments which were a mismatch.

Insert Figures 1 and 2

Since the point of intersection for the regression lines shifted on the reteach session, a corresponding movement in the regions of significance was to be expected. For the teach session the left and right regions of significance extended beyond the points 4.26 and 4.98. A total of 77% of the plots fell within these two regions. Forty-one percent represented subjects who were matched properly with respect to treatments. Subjects who received the unstructured treatment accounted for 35% of the total. Only 6% of the subjects who were administered

the structured treatment obtained low cognitive-memory question ratios as predicted. These results suggest that the unstructured treatment benefited more subjects than the structured treatment did.

The mean and standard deviation of scores for Group 1 for the teach session were .29 and .17 respectively. The same statistics for Group 2 were similar, .37 and .17. Distribution curves for both groups were skewed slightly in a positive direction. Kurtosis was close to normalcy for the two groups. Based upon the sample sizes, the probability of obtaining both of these curves was as expected.

Group 1 and Group 2 had correlation coefficients to which some confidence could be attached. The correlation coefficient for Group 2 was significant ($r = -.37$, $p < .05$). Although more plots fell within the region of significance associated with Group 1, the strength of the correlation coefficient for Group 2 indicated more confidence could be placed in the plots located in the right region of significance. These subjects in Group 2, who were matched on the structured treatment, represented six percent of the total group.

On the reteach session the regions of significance moved to 3.36 on the left and 4.15 on the right. The total percentage of plots within the two regions was 61%. In contrast to the teach session, only 10% of the scores for the subjects who were given the unstructured treatment fell in the predicted portion of the left region of significance. The percentage of subjects represented in the right region increased to 24%.

For the reteach session the means for Group 1 and Group 2 were .32 and .30. Standard deviations were .19 and .17. The distribution curve for Group 1 was moderately flat with almost no skew. A curve for Group 1 comparable to that obtained on the teach session. Scores for Group 2 produced a curve which was noticeably leptokurtic and positively skewed. This curve approached chance occurrence. Subjects in Group 2 who had lower aptitude scores tended to lower their cognitive-memory question ratios on the reteach session.

Correlation coefficients for Groups 1 and 2 were .44 and -.14. The .05 level of significance was reached for the correlation coefficient of Group 1. As in the teach session, fewer plots were located in the region of significance where the strength of the correlation coefficient was the greatest. Group 1, subjects matched on the unstructured treatment, had a total of 6 subjects or 10% of the sample in the left region of significance.

The maximum confidence level in the replicability of the two disordinal interactions would be equivalent to the lowest percentage of occurrence in each region of significance. For data on cognitive-memory question ratios, replicability was 10% for Group 1 in the left region of significance and 6% for Group 2 in the right region. These percentages represent subjects properly matched as to treatment group. Six subjects were in Group 1 and four subjects were in Group 2. Due to the exceptional distribution of scores obtained for Group 2 on the reteach session, the replicability of the two disordinal interactions must be viewed with caution.

CONCLUSIONS

Results of this study suggest that the interactive effects between student characteristics and methods of instruction can be investigated productively using the "matching" model developed by Hunt (1971). Although significant disordinal interactions were limited to the cognitive-memory question ratios of the subjects, the evidence tends to indicate that the structured and unstructured treatments were minimally effective. Subjects who were administered treatments which matched their level of aptitude did restrict their use of cognitive-memory questions. Reducing the use of questions requiring lower cognitive skills by means of instruction in the skill of questioning is becoming well documented in educational research literature. Inclusion of additional aptitude measures of conceptual structure plus more refined treatments if included by the researcher could produce similar interactions with different question ratios on other microteaching tasks. These results coincide with those obtained by Koran (1969) and Morse (1969) suggesting that methods of presentation have a tendency to interact with student characteristics when skills of questioning are being acquired.

REFERENCES

Amidon, E. J. & Flanders, N. A. The role of the teacher in the classroom. Minneapolis, Minnesota: Association for Productive Teaching, 1967.

Berliner, D. C. & Cahen, L. S. Trait-treatment interactions and learning. In Kerlinger, F. N. (Ed.), Review of Research in Education, 1973, in press.

Borich, G. D. Interactions among group regressions: Testing homogeneity of group regressions and plotting regions of significance. Educational and Psychological Measurement, 1971, 31, 251-253.

Bracht, G. H. Experimental factors related to aptitude-treatment interactions, Review of Educational Research, 1970, 40, 627-645.

Campbell, D. T. & Stanley, J. C. Experimental and quasi-experimental designs for research on teaching. In Gage, N. L. (Ed.), Handbook of Research on Teaching. Chicago: Rand McNally, 1963.

Cronbach, L. J. How can instruction be adapted to individual differences. In Gagne, R., (Ed.), Learning and individual differences. Columbus, Ohio: Charles E. Merrill, 1967.

Cronbach, L. J. The two disciplines of scientific psychology. American Psychologist, 1957, 12, 671-684.

Cronbach, L. J. & Snow, R. E. Individual differences in learning ability as a function of instructional variables. (Final Report USOE OEC 4-6-061269-1217) Stanford, Calif.: Stanford University, 1969.

Flanders, N. A. Analyzing teaching behavior. Reading, Mass.: Addison-Wesley, 1970.

Gallagher, J. J. & Aschner, M. J. A preliminary report on analysis of classroom interaction. Merrill-Palmer Quarterly of Behavior and Development, 1963, 9, 183-194.

Gregory, T. B. A computer program for the compilation of data from classroom observation systems having mutually exclusive categories. Educational and Psychological Measurement, 1971, 31, 763-768.

Harvey, O. J. Beliefs and behavior: Some implications for Education. Science Teacher, 1970, 37, 10-14, 73.

Harvey, O. J., Hunt, D. E., & Schroder, H. M. Conceptual systems and personality organization. New York: John Wiley, 1961.

Harvey, O. J., White, B. J., & Coates, C. Observation scales of classroom atmosphere and student behavior: A replication and refinement. Paper presented at the annual meeting of the American Educational Research Association, Minneapolis, Minnesota, 1970.

Harvey, O. J., Prather, M., White, B. J., Alter, R. D., & Hoffmeister, J. K. Teachers' belief systems and preschool atmosphere. Journal of Educational Psychology, 1966, 57, 373-381.

Harvey, O. J., Prather, M., White, B. J., & Hoffmeister, J. K. Teachers' beliefs, classroom atmosphere and student behavior. American Educational Research Journal, 1968, 5, 151-166.

Hunt, D. E. Matching models in education: The coordination of teaching methods with student characteristics. (Monograph Series No. 10) Ontario, Canada: Ontario Institute for Studies in Education, 1971.

Koran, M. L. The effects of individual differences of observational learning in the acquistion of a teaching skill. Unpublished doctoral dissertation, Stanford University, 1969.

Lubin, A. The interpretation of significant interaction. Educational and Psychological Measurement, 1961, 21, 807-817.

Morse, K. R. A comparison of the effects of laboratory and non-laboratory instruction on the questioning behaviors of beginning teacher candidates. Unpublished doctoral dissertation, The University of Texas at Austin, 1969.

Murphy, P. D. & Brown, M. M. Conceptual systems and teaching styles. American Educational Research Journal, 1970, 7, 529-540.

Solomon, G. Heuristics for the generation of aptitude-treatment interaction hypotheses. Paper presented at the annual meeting of the American Educational Research Association, New York, 1971.

Walker, H. M. & Lev, J. Statistical inference. New York: Henry Holt, 1953.

TABLE 1

F Ratios for Homogeneity of Croup Regressions Test
Using the Need for Structure-Order Subscale as Predictor

Hypothesis	Question Ratios			
Micro-Lesson	CM	C	D	E
Teach	7.61**	0.62	1.00	0.67
Reteach	5.36*	0.51	1.26	0.05

* $p < .05$
** $p < .01$

TABLE 2

Summary Statistics for the Teach Session of the Hypothesis Micro-Lesson Using the Need for Structure-Order Subscale as the Predictor and the Cognitive-Memory Question Ratio as the Criterion

(N_1=32; N_2=32)

Summary Statistics	
Mean Group 1	.29
Mean Group 2	.37
S. D. Group 1	.17
S. D. Group 2	.19
Skewness Group 1	1.08
Skewness Group 2	.67
Kurtosis Group 1	-.69
Kurtosis Group 2	.56
Intercept Group 1	.04
Intercept Group 2	.76
Slope Group 1	.0006
Slope Group 2	-.0009
Corr. Coeff. Group 1	.29
Corr. Coeff. Group 2	-.37*

* $p < .05$

TABLE 3

Summary Statistics for the Reteach Session of the Hypothesis Micro-Lesson Using the Need for Structure-Order Subscale as the Predictor and the Cognitive-Memory Question Ratio as the Criterion
(N_1=29; N_2=30)

Summary Statistics	
Mean Group 1	.32
Mean Group 2	.30
S. D. Group 1	.19
S. D. Group 2	.17
Skewness Group 1	.34
Skewness Group 2	2.50
Kurtosis Group 1	-.90
Kurtosis Group 2	1.58
Intercept Group 1	-.11
Intercept Group 2	.42
Slope Group 1	.0011
Slope Group 2	-.0003
Corr. Coeff. Group 1	.44*
Corr. Coeff. Group 2	-.14

* $p < .05$

FIGURE 1

INTERACTION OF NEED FOR STRUCTURE-ORDER SUBSCALE SCORES WITH DIFFERENTIAL TREATMENTS FOR COGNITIVE-MEMORY QUESTION RATIO FOR THE TEACH SESSION OF THE HYPOTHESIS MICRO-LESSON

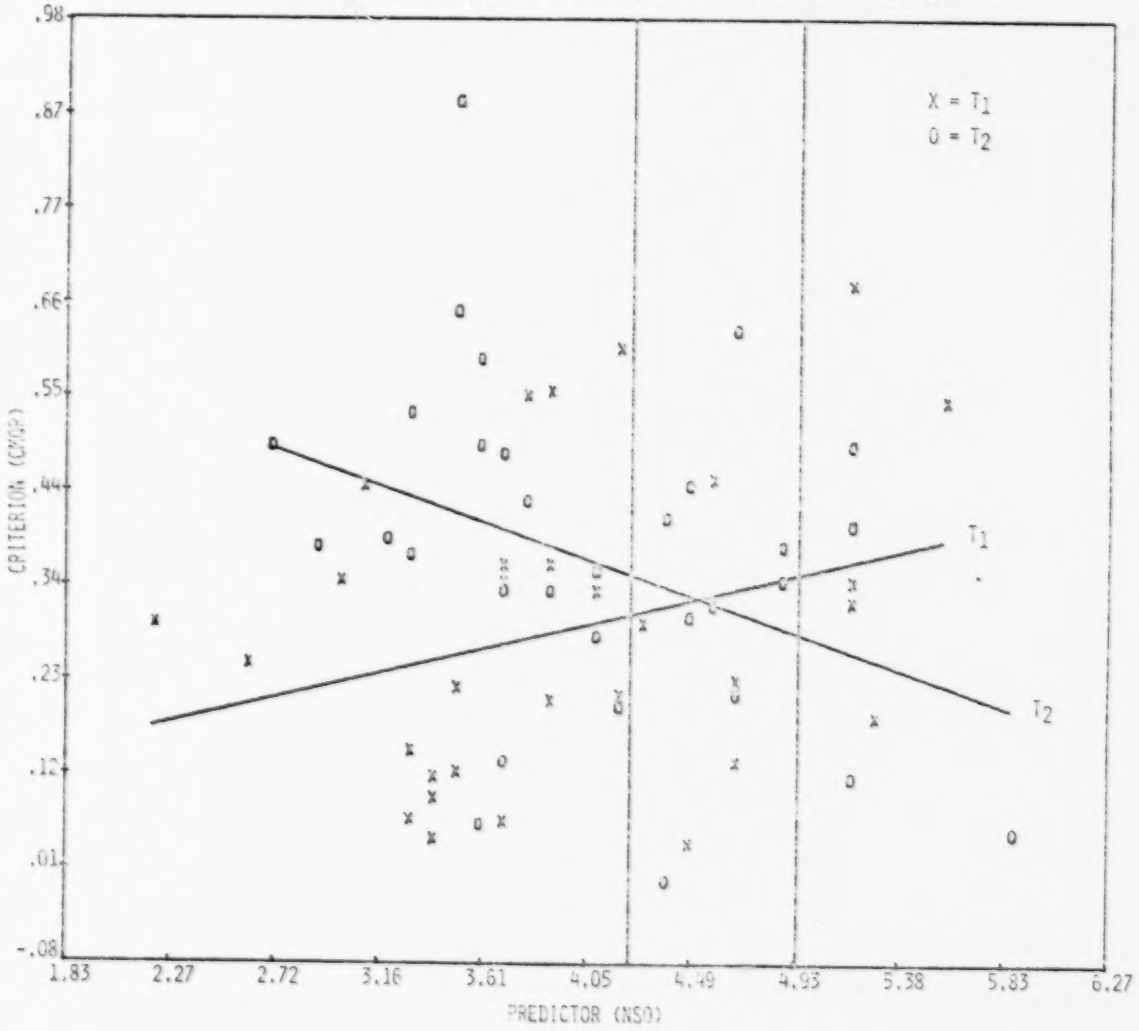

FIGURE 2

INTERACTION OF NEED FOR STRUCTURE-ORDER SUBSCALE SCORES WITH DIFFERENTIAL TREATMENTS FOR COGNITIVE-MEMORY QUESTION RATIO FOR THE RETEACH SESSION OF THE HYPOTHESIS MICRO-LESSON